Antimicrobial activity and phytochemical constituents of *Plumbago zeylanica* plant extracts

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Introduction and Objectives: *Plumbago zeylanica* (Ela nitul) is known as Ceylon leadwort and used in traditional medicine to treat various diseases. The aim of this study was to investigate the phytochemical constituents and antimicrobial activity of different *P. zeylanica* plant extracts (roots, leaves and stems) against selected pathogenic microorganisms *in vitro*.

Methods: The decoction was used to prepare aqueous extracts of roots, leaves and stems of *P. zeylanica* and dry powdered 30g of plant material extracted with 100 ml of sterile double distilled water (SDDW). The antimicrobial activity of the prepared plant extracts was studied using the well diffusion assay (6mm) and microbroth dilution method against *Staphylococcus aureus* (ATCC 25923), *Acinetobacter baumannii* (clinical strain), *Pseudomonas aeruginosa* (ATCC 27853), *Escherichia coli* (ATCC 25922) and *Candida albicans* (ATCC 10231). Gentamicin (8 µg/ml) (antibacterial agent), Nystatin (25 µg/ml) (antifungal agent) were the positive controls while SDDW was the negative control. Qualitative screening of the phytochemicals was done using standard methods.

Results: The stem extract of *P. zeylanica* did not show antimicrobial activity against the selected organisms. Zones of inhibition for other extracts are given in Table 1.

Table 1. Antimicrobial activity of tested plant products.

Inhibition Zones against bacterial and fungal strains				MIC of *P. zeylanica* root extract
Organisms	Diameter Zone of inhibition (mm) (Mean ± SD)			mg/ml (mean ± SD)
	Root extract 300mg/ml	Leaf extract 300mg/ml	Gentamicin (8 µg/ml)	
S. aureus (ATCC 25923)	14.3 ± 0.6	12.0 ± 1.0	28.7 ± 0.6	2.4
A. baumannii (clinical isolate)	17.3 ± 0.6	14.3 ± 0.6	27.3 ± 1.2	2.4
P. aeruginosa ATCC 10662)	18.3 ± 1.2	-	28.3 ± 1.5	3.9 ± 1.4
E. coli (ATCC 25922)	-	-	27.7 ± 0.6	6.3 ± 2.7
Candida albicans (ATCC 10231)	35.7 ± 0.6	17.3 ± 0.6	21 ± 2.0*	0.8 ± 0.3

SD – standard deviation *Nystatin (25 µg/ml)

Secondary phytochemicals including alkaloids, flavonoids, steroids, saponins, tannins and chalcones were detected in the root, leaf and stem aqueous extracts.

Conclusions: *Plumbago zeylanica* root extract has shown the highest antimicrobial activity when compared to leaf and stem extracts. It was most effective against *C. albicans* showing higher antifungal activity. The antibacterial property of these plant extracts could be mainly due to their phenolic and flavonoid content.

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